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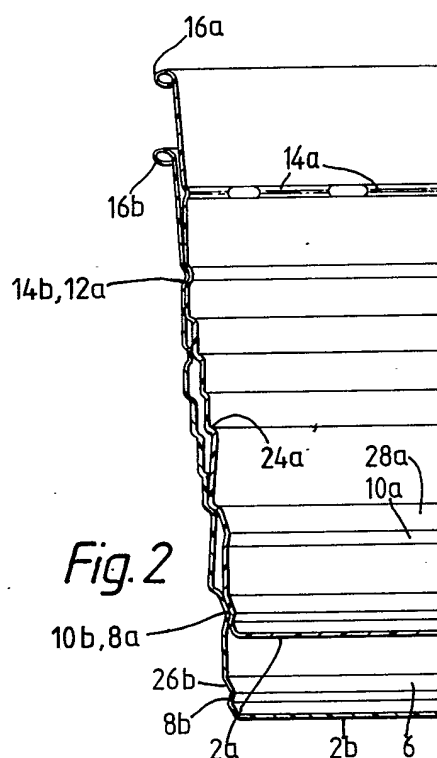
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(54) Cups of thin plastics material

(57) In a pair of inserted cups, a space 6 is isolated by cooperation between an external sealing surface 8a and an internal sealing surface 10b. Both surfaces are frusto-conical and converge upwardly. Locking means 12a, 14b maintain a contact force between the sealing surfaces, but permit the cups to be assembled and separated by external forces.



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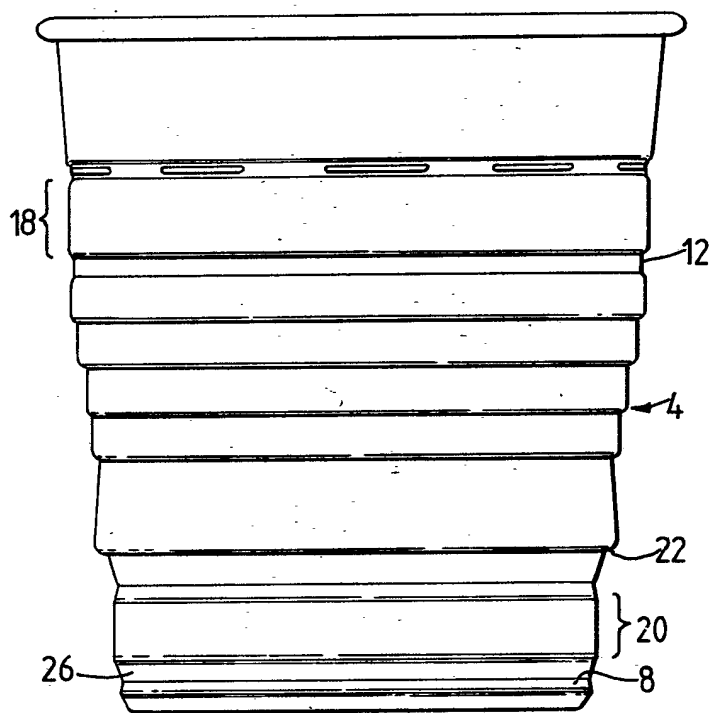


Fig. 1

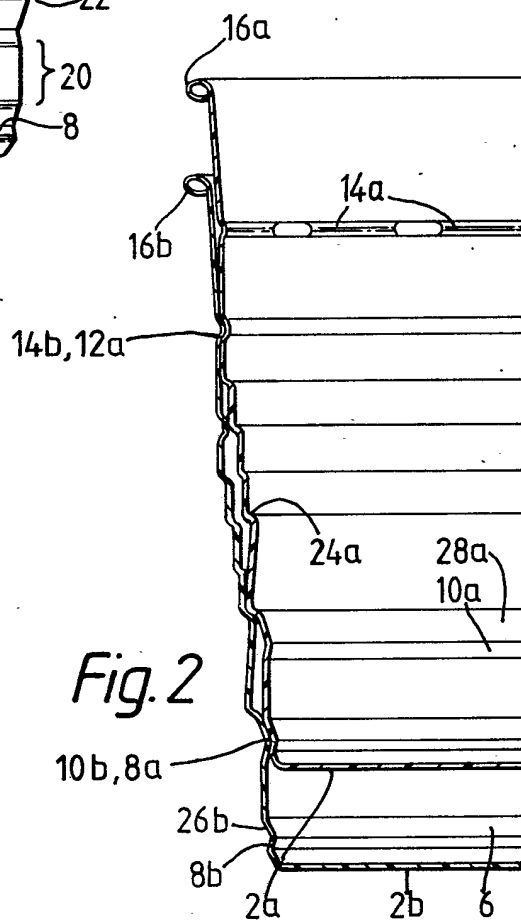


Fig. 2

SPECIFICATION

Cups of thin plastics material

5 This invention relates to cups of thin plastics material capable of nesting with identical cups to form a stack, each cup comprising a bottom wall and a sidewall extending generally upwards and outwards from the bottom wall, the cup including lower, external and upper, internal locking means which, when an upper and a lower cup, in upright attitude, are in nesting engagement, cooperate to resist separation of the cups, but nevertheless to permit the cups to be separated by external forces.

15 One use of such cups is as so-called "ingredient cups". Such cups are assembled together in a stack, with a measured quantity of powdered ingredient in each of the spaces defined between the bottom walls of adjacent cups. Typically such an ingredient serves to provide a beverage when a single cup is separated from the stack and is filled with hot water.

It is desirable to provide a seal between adjacent cups, thus isolating the space between the bottom walls, in order to prevent escape of the powder during transport and handling of the stack, and also to prevent access of the atmosphere to the powder.

25 The present invention is particularly concerned with a way of providing such a seal.

A cup according to the present invention is of thin plastics material capable of nesting with identical cups to form a stack, the cup comprising a bottom wall and a sidewall extending generally upwards and outwards from the bottom wall; the sidewall including a lower, external sealing surface facing obliquely upwards and an upper, internal sealing surface facing obliquely downwards, arranged so that, when an upper and a lower cup, in upright attitude, are in nesting engagement, the external sealing surface of the upper cup co-operates with the internal sealing surface of the lower cup to make a seal which isolates the space between the bottom walls of the two cups, and so that separation of the two cups requires deformation enabling the sealing surfaces to ride past each other; the side walls also including lower, external and upper, internal locking means which, when two cups are in the said nesting engagement, co-operate to establish and maintain a contact force between the sealing surfaces, and also to resist separation of the cups but nevertheless to permit the cups to be separated by external forces; the arrangement being such that two cups can also be assembled into the said nesting engagement by the application of external forces.

55 Preferably the sealing surfaces are frusto-conical, convergent upwards, each with a semi-vertical angle of about 20°.

Preferably the lower external sealing surface is close to the bottom wall, and the locking means are in the upper half of the side wall.

60 Preferably the side wall also includes lower, external and upper, internal shoulders, which strongly resist telescoping of two cups together beyond the

said nesting engagement.

65 The cup may be either single-walled or double-walled. In the latter case, the external sealing surface and locking means are on the outer cup, while the internal sealing surface and locking means are on the inner cup, and the same is true of the external and internal shoulders if present.

70 The accompanying drawings serve to illustrate the embodiment of the invention in a single-walled cup. In these drawings:—

Figure 1 is a side elevation; and

75 Figure 2 is a half vertical section of two cups in nesting engagement.

In Figure 2 the components of the upper cup have the suffix a, while the components of the lower cup have the suffix b.

Each cup has a bottom wall 2, and a side wall 4 extending generally upwards and outwards from the bottom wall.

80 The space 6 between adjacent bottom walls is isolated by co-operation between an external sealing surface 8 and an internal sealing surface 10. Both these sealing surfaces are frusto-conical, convergent upwards. It is apparent from Figure 2 that separation of the two cups requires deformation of one or both cups, so that the circumference of the upper boundary of the sealing surface 10b of the lower cup becomes as great as the circumference of the lower boundary of the sealing surface 8a of the upper cup.

The side wall 4 also includes lower external locking means, constituted by a continuous circumferential groove 12 and upper, internal locking means constituted by an annular series of internal projections 14. When the cups are brought into nesting engagement, the locking means 14b of the lower cup snaps into the locking means 12a of the upper cup, and the locking means then co-operate to resist separation of the cups, but nevertheless to permit the cups to be separated by external forces, for example upward force applied to the rim 16a of the upper cup and downward force applied to the rim 16b of the lower cup by mechanism in a vending machine.

105 Furthermore, the vertical spacing of the sealing surfaces and of the respective locking means is such that, in the nesting engagement, the side wall of the upper cup is in tension while the side wall of the lower cup is in compression. This situation establishes and maintains a contact force between the sealing surfaces. This will resist penetration of grains of ingredient between the sealing surfaces, even when the cups are subjected to some vibration during handling.

115 If a larger number of cups are in a stack, then the state of compression will be in the portion of the side wall marked 18 in Figure 1, while the state of tension will be in the portion marked 20.

The side wall 4 also includes a lower external shoulder 22 and an upper internal shoulder 24. In the nested condition the shoulders 22a and 24b are in contact or very nearly so, and they strongly resist telescoping of the two cups together beyond the nested condition. However, in a situation in which

the two cups are subjected to forces tending to telescope the cups together, the cups may move slightly together beyond the normal nested relationship, so that a slight gap opens between the sealing surfaces 8a and 10b. In that situation, contact occurs between downwardly convergent surfaces 26a and 28b, thus establishing a temporary auxiliary seal.

CLAIMS

1. A cup of thin plastics material capable of nesting with identical cups to form a stack, the cup comprising a bottom wall and a sidewall extending generally upwards and outwards from the bottom wall; the sidewall including a lower, external sealing surface facing obliquely upwards and an upper, internal sealing surface facing obliquely downwards, arranged so that, when an upper and a lower cup, in upright attitude, are in nesting engagement, the external sealing surface of the upper cup cooperates with the internal sealing surface of the lower cup to make a seal which isolates the space between the bottom walls of the two cups, and so that separation of the two cups requires deformation enabling the sealing surfaces to ride past each other; the side walls also including lower, external and upper, internal locking means which, when two cups are in the said nesting engagement, cooperate to establish and maintain a contact force between the sealing surfaces, and also to resist separation of the cups but nevertheless permit the cups to be separated by external forces; the arrangement being such that two cups can also be assembled into the said nesting engagement by the application of external forces.

2. A cup according to claim 1, in which the sealing surfaces are frusto-conical, convergent upwards, each with a semi-vertical angle of about 20°.

3. A cup according to claim 1 or claim 2, in which the lower external sealing surface is close to the bottom wall, and the locking means are in the upper half of the side wall.

4. A cup according to any of claims 1 to 3, in which the side wall also includes lower, external and upper, internal shoulders, which strongly resist telescoping of two cups together beyond the said nesting engagement.

5. A cup according to any of claims 1 to 4, including downwardly convergent surfaces adjacent to the sealing surfaces.

6. A cup according to any of claims 1 to 5, which is double-walled, and in which the external sealing surface and locking means are on the outer cup, while the internal sealing surface and locking means are on the inner cup.

7. A cup according to claim 1, substantially as described with reference to the accompanying drawings.